

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1-34. (Cancelled)

35. (Previously Presented) A control system for a cooling system having a compressor and a valve, said control system comprising:

a first sensor for sensing a property indicative of demand for cooling; and

a controller coupled to said sensor and operable to produce a variable duty cycle control signal in response to said property, said controller modulating a capacity of said compressor and a position of said valve according to the same variable duty cycle control signal to vary a cooling capacity of the cooling system.

36. (Previously Presented) The control system of claim 35 wherein said sensor senses pressure and wherein said controller produces said variable duty cycle control signal with a variable cycle time that is a function of fluctuations in sensed pressure.

37. (Previously Presented) The control system of claim 35 wherein said first sensor is a temperature sensor.

38. (Previously Presented) The control system of claim 35 further comprising a pressure sensor in addition to said first sensor, said pressure sensor coupled to said controller.

39. (Cancelled)

40. (Currently Amended) The control system of claim 35 wherein said first sensor senses a property having a first rate of change and wherein said control system further comprises a second sensor that senses a second property having a second rate of change, said second property used by said controller along with said property to produce said variable duty cycle control signal and said second rate of change being substantially greater than said first rate of change.

41. (Previously Presented) The control system of claim 40 wherein said first sensor senses changes in temperature and wherein said second sensor senses changes in pressure.

42. (Previously Presented) The control system of claim 35 wherein said controller varies said cooling capacity by selectively rendering compressing members of the compressor effective and ineffective.

43. (Previously Presented) The control system of claim 35 wherein controller provides said variable duty cycle control signal that cycles at a cycle time shorter than the time constant of the load.

44. (Previously Presented) The control system of claim 35 wherein said controller varies said cooling capacity between substantially one hundred percent capacity and substantially zero percent capacity.

45. (Previously Presented) The control system of claim 35 further comprising a diagnostic module for comparing said duty cycle with a value indicative of a system condition.

46. (Previously Presented) The control system of claim 45 further comprising an alert module responsive to said diagnostic module for issuing an alert signal when said duty cycle bears a predetermined relationship to said value.

47. (Previously Presented) The control system of claim 35 wherein said valve is a suction-side pressure regulator.

48. (Previously Presented) The control system of claim 35 wherein said valve is a liquid-side expansion valve.

49. (Previously Presented) The control system of claim 35 wherein said valve is a pulsing solenoid valve.

50. (Previously Presented) The control system of claim 35 wherein said valve is a stepper valve.

51. (Previously Presented) A cooling system comprising:
a refrigeration case;
an evaporator disposed in said case;
a condenser in fluid communication with said evaporator;
a valve in fluid communication with said evaporator and said condenser;
a pulse-width-modulated variable capacity compressor in fluid communication with said condenser, said evaporator, and said regulator;
a first sensor for sensing a property indicative of a demand for cooling; and
a controller responsive to said first sensor and providing a variable duty cycle control signal, said controller modulating a capacity of said compressor and a position of said valve according to the same variable duty cycle control signal to vary a cooling capacity of the cooling system.

52. (Previously Presented) The cooling system of claim 51 further comprising a second refrigeration case having a second evaporator disposed therein, said second evaporator being coupled in fluid communication with said condenser.

53. (Previously Presented) The cooling system of claim 51 wherein said first sensor is a temperature sensor.

54. (Previously Presented) The cooling system of claim 51 wherein said controller produces said variable duty cycle control signal with a variable cycle time that is a function of fluctuations in pressure.

55. (Previously Presented) The cooling system of claim 51 further comprising a pressure sensor in addition to said first sensor, said pressure sensor coupled to said controller.

56. (Previously Presented) The cooling system of claim 51 wherein said valve includes a stepper motor.

57. (Previously Presented) The cooling system of claim 51 wherein said controller provides said variable duty cycle control signal that cycles at a cycle time shorter than the time constant of the load.

58. (Previously Presented) The cooling system of claim 51 wherein said controller varies cooling capacity between substantially one hundred percent capacity and substantially zero percent capacity.

59. (Previously Presented) The cooling system of claim 51 wherein said compressor is selectively operable in at least two states, said compressor comprising a pair of fluid compressing members and including a first state corresponding to a first capacity wherein said pair of fluid compressing members are separated by a seal and a second state corresponding to a second capacity lower than said first capacity wherein said seal between said pair of fluid compressing members is broken.

60. (Previously Presented) The cooling system of claim 59 wherein said compressor pumps a refrigerant under pressure and wherein said controller produces said control signal with a variable cycle time that is a function of fluctuations in refrigerant pressure.

61. (Previously Presented) The cooling system of claim 59 wherein said compressor includes fluid compressing members and mechanism for selectively rendering said compressing members effective and ineffective to thereby assume said first state and said second state, respectively.

62. (Previously Presented) The cooling system of claim 59 wherein said compressor includes an electric motor and wherein said compressor is configured such that said electric motor remains energized in said first and second states.

63. (Currently Amended) The cooling system of claim 51 wherein said first sensor senses a property having a first rate of change and wherein said control system

further comprises a second sensor that senses a second property having a second rate of change, said second property used by said controller along with said property to produce said variable duty cycle control signal and said second rate of change being substantially greater than said first rate of change.

64. (Previously Presented) The cooling system of claim 63 wherein said first sensor senses changes in temperature and wherein said second sensor senses changes in pressure.

65. (Previously Presented) The cooling system of claim 51 wherein said compressor has two mechanical elements separated by a seal, said mechanical elements being movable relative to one another to develop fluid pressure and wherein said compressor includes mechanism to selectively break said seal in response to said control signal to thereby alter said fluid pressure developed while allowing said mechanical elements to maintain substantially constant relative movement with one another.

66. (Previously Presented) The cooling system of claim 51 wherein said compressor is a scroll compressor.

67. (Previously Presented) The cooling system of claim 51 wherein said controller produces a control signal that cycles at a cycle time at least four times shorter than the time constant of the load.

68. (Currently Amended) The control system of claim 37, further comprising a pressure sensor coupled to said controller that produces a signal indicative of sensed pressure for use by the controller along with said property in generating said variable duty cycle control signal.

69. (Currently Amended) The cooling system of claim 53, further comprising a pressure sensor coupled to said controller that produces a signal indicative of sensed pressure for use by the controller along with a signal from said first sensor in generating said variable duty cycle control signal.